

(12) UK Patent Application (19) GB (11) 2 252 198 A (13)
(43) Date of A publication 29.07.1992

(21) Application No 9101365.6

(22) Date of filing 22.01.1991

(71) Applicant
Chung Pak Investment Limited

(Incorporated in Hong Kong)

7th Floor Chung Pak Commercial Building,
2 Cho Yuen Street, Ya Tong Bay, Kowloon, Hong Kong

(72) Inventor
Wilson Ip Kam-Wah

(74) Agent and/or Address for Service
D Young & Co
10 Staple Inn, London, WC1V 7RD, United Kingdom

(51) INT CL⁶
H01M 2/12

(52) UK CL (Edition K)
H1B B212B

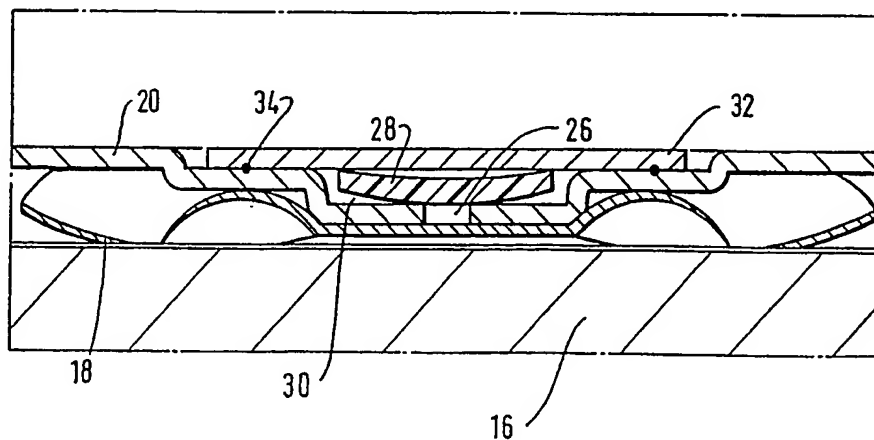
(56) Documents cited
GB 2223348 A GB 2156574 A GB 1271286 A
GB 1258210 A GB 1074813 A

(58) Field of search
UK CL (Edition K) H1B
INT CL⁶ H01M

(54) Resealable vent in batteries

(57) A battery eg. Ni-Cd button-cell includes a one-way vent valve, which can open to release gas built up within the battery, when the pressure of the gas has reached a predetermined value, and which can close when the gas pressure is below the predetermined value. Concave vent plug 28 is located over hole 26 in cell top-cap 20, and cover plate 32 is spot-welded at points 34 so that plug 28 is compressed and seals the hole 26. At a predetermined pressure, plug 28 is deformed allowing gases to enter area 30 and flow out between the weld points.

FIG. 2



1/2

FIG. 1

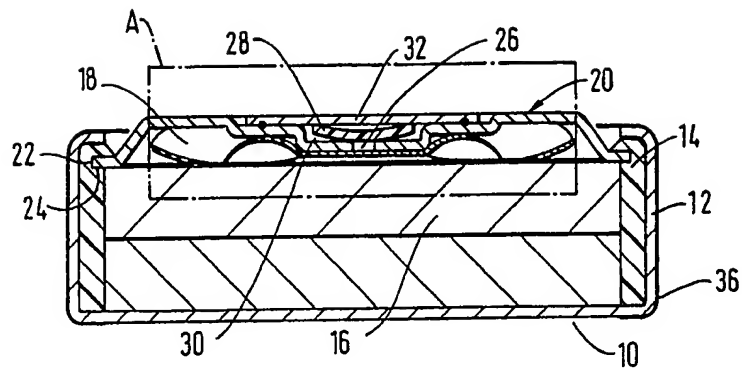
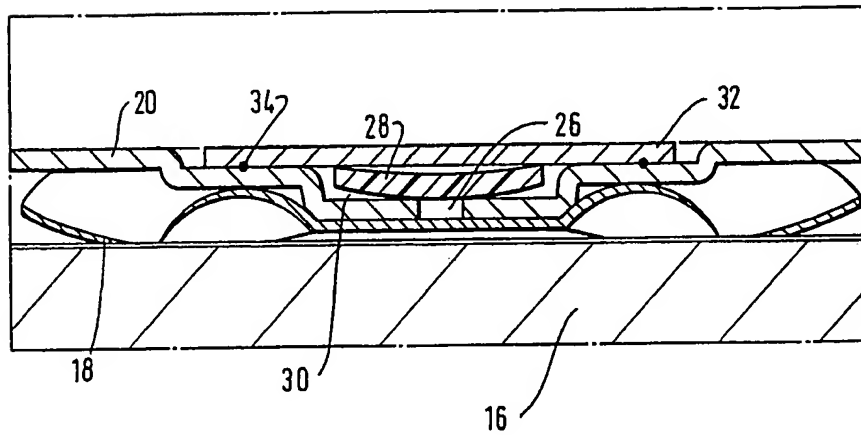
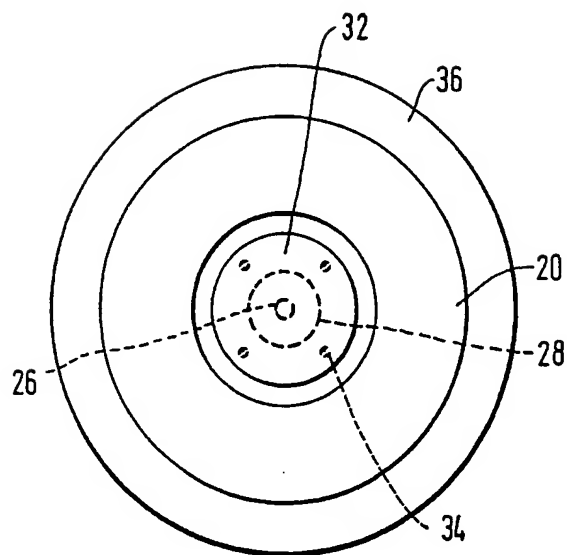


FIG. 2



2/2

FIG. 3



BATTERIES

This invention relates to a battery, in particular, but not exclusively, to a button-cell battery.

5 Batteries such as nickel cadmium button-cells are well known. Such a battery may be used to power calculators, TV remote control units etc. One problem that exists with these batteries is that they may develop a pressure inside due to the build up of gas, which is produced as a result of the electrochemical reaction that produces the
10 EMF of the battery. This is obviously undesirable and it is usual to vent the battery to allow the gas to escape.

The usual method of venting the battery is to have a weakened area in the battery case which will puncture when the internal pressure of the battery exceeds a predetermined pressure. This, however, will
15 cause the battery to dry up and fail relatively quickly.

Thus one object of this invention is to provide a battery in which pressure may be released without causing any damage to the battery.

According to one object of the present invention there is provided a battery having a housing with a one-way vent valve in a wall
20 of the housing which opens to release gas above a predetermined pressure from the housing and which closes once the gas pressure has reduced.

One of the advantages of this invention is that pressure build up within the battery may be released whilst the battery remains intact,
25 does not dry up and does not fail.

Reference will now be made, by way of example, to the accompanying drawings in which:-

Figure 1 is a cross sectional view of a battery according to the present invention;
30

Figure 2 is cross sectional view of the section A of the Figure 1 battery; and

Figure 3 is a top view of the battery of Figure 1.

Referring to Figure 1, a battery shown generally at 10, comprises
35 a metallic body can 12, which is substantially right-circularly cylindrical. A gasket 14 is inserted inside the body can the gasket being of an insulative material. The internal components of the

battery are located within area 16 and are not shown as such. It will be appreciated however, by those skilled in the art, that the internal contents may be similar to those found in any other button cell battery.

5 A contact spring 18 is located on top of the internal components in area 16 of the battery. A top cap 20 is mounted on top of the contact spring. The periphery 22 of the cap is located within a groove 24 in the gasket. Area 16 of the battery is thus sealed apart from a hole 26 which is located in the top cap. A vent plug 28 which is a
10 slightly concave plastics disc is located over hole 26 in area 30 of the top cap. A cover plate 32 is applied over area 30 and spot welded at four points 34 (only two of which are shown). Application of cover plate 32 causes disc 28 to be slightly compressed, thereby sealing hole 26, and thus area 16.

15 In use the internal components of the battery undergo electro-chemical reactions. As already disclosed these reactions can produce gas which gradually causes a build up of pressure within chamber 16. At a predetermined pressure, these gases are of sufficiently high pressure to cause distortion of vent plug 28. Vent plug 28 becoming flatter and
20 less concave thereby allowing gases to enter area 30, ie. the space between the top cap and the cover plate. Since the top cap and the cover plate are only spot welded together at four points, gases can pass between them at other points on the surface. Thus the pressure in area 16 is vented. As the pressure drops below the predetermined value,
25 which will open the vent, the vent closes, and the battery continues operation as usual. The operation of venting the gases from area 16 occurs whenever the pressure within area 16 reaches the predetermined value necessary to open the vent plug.

30 A PVC cover 36, of an insulative material, may be applied to the battery to isolate the positive contact area of the battery from its base.

35 The following components of the battery are preferably made of metal: the contact spring, the cover plate, the top cap and the body can. The gasket and the vent plug are both preferably made off insulative material. However, the vent plug may be replaced by any resilient material which will distort due to the pressure exerted through hole 26, thereby causing the hole to open.

It should be noted that although the invention has been described with reference to a Nickel Cadmium battery, the basic design may be applied to any other type of battery where a gas build-up in area 16 is likely.

5 The PVC cover is an optional feature which may be dispensed with according to whether the positive contact area needs to be isolated from the base of the battery.

There may be, in certain applications, more than one venting assembly as described, disposed over the surface of the top cap 20.

10 In the assembly shown the cover plate is spot welded to the top cap in four positions. This is only a preferred number of welds. More or less spot welds may be applied depending on the application required.

15 In the areas where the spot weld occurs it is likely that the metal structure of one of the surfaces will be slightly distorted, allowing the passage of gas from the battery between the top cap and the cover plate.

CLAIMS

1. A battery having a housing with a one-way vent valve in a wall of the housing, which opens to release gas above a predetermined pressure from the housing, and which closes once the gas pressure has reduced.
2. A battery according to claim 1, wherein the battery is a dry cell.
3. A battery according to claim 1 or claim 2, wherein the battery is a Nickel Cadmium cell.
4. A battery according to any one of claims 1,2 and 3, wherein the battery is a button cell.
5. A battery according to any one of the preceding claims, wherein there is more than one vent valve.
6. A battery according to any one of the preceding claims, wherein the or each vent valve includes a vent hole located in an indentation in the housing; a resilient member located substantially within the indentation, and at least part of the member overlying the vent hole; and a cover for deforming the resilient member so that the vent hole is normally closed, and when the predetermined pressure is exceeded the resilient member deforms to open the vent hole.
7. A battery according to Claim 6 wherein said cover is secured to the housing at one or more points.
8. A battery according to claim 7, wherein the securing of the cover to the housing is by means of a spot weld at the or each point.
9. A battery according to any one of claims 6,7 and 8, wherein the deformable member comprises a dished disc having a convex side facing the vent hole.
10. A battery substantially as hereinbefore described, with reference to, and as illustrated in, the accompanying drawings.

- 5 -

Patents Act 1977
Examiner's report to the Comptroller under
Section 17 (The Search Report)

Application number
 9101365.6

Relevant Technical fields

(i) UK Cl (Edition K) H1B

(ii) Int Cl (Edition 5) H01M

Databases (see over)

(i) UK Patent Office

(ii)

Search Examiner

M J INSLEY

Date of Search

4 SEPTEMBER 1991

Documents considered relevant following a search in respect of claims 1-10

Category (see over)	Identity of document and relevant passages	Relevant to claim(s)
X	GB 2223348 A (SYLVA) - see Claim 1, page 1 line 24 - page 2 line 4 and Figures 1-3,6	1-5 at least
X	GB 2156574 A (CHLORIDE) - see page 2 lines 42-80 and the Figure	1,2,5,6, 9 at least
X	GB 1271286 (EVERREADY) - see page 2 lines 46- 80 and Figures 1,2	1-3,5,6, 7,8 at least
X	GB 1258210 (GULTON) - see page 2 line 54 - page 3 line 35 and Figures 2,3	1-4,5,6 at least
X	GB 1074813 (ALKALINE BATTERIES)	1-4,6,7,8

Category	Identity of document and relevant passages	Relevant to claim(s)

Categories of documents

X: Document indicating lack of novelty or of inventive step.

Y: Document indicating lack of inventive step if combined with one or more other documents of the same category.

A: Document indicating technological background and/or state of the art.

P: Document published on or after the declared priority date but before the filing date of the present application.

E: Patent document published on or after, but with priority date earlier than, the filing date of the present application.

&: Member of the same patent family, corresponding document.

Databases: The UK Patent Office database comprises classified collections of GB, EP, WO and US patent specifications as outlined periodically in the Official Journal (Patents). The on-line databases considered for search are also listed periodically in the Official Journal (Patents).

**This Page is Inserted by IFW Indexing and Scanning
Operations and is not part of the Official Record**

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- ☐ **BLACK BORDERS**
- ☐ **IMAGE CUT OFF AT TOP, BOTTOM OR SIDES**
- ☐ **FADED TEXT OR DRAWING**
- ☐ **BLURRED OR ILLEGIBLE TEXT OR DRAWING**
- ☐ **SKEWED/SLANTED IMAGES**
- ☐ **COLOR OR BLACK AND WHITE PHOTOGRAPHS**
- ☐ **GRAY SCALE DOCUMENTS**
- ☐ **LINES OR MARKS ON ORIGINAL DOCUMENT**
- ☐ **REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY**
- ☐ **OTHER:** _____

IMAGES ARE BEST AVAILABLE COPY.

As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.